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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Hyoung-Soo Lim

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EXAMINER

NGUYEN, LEON VIET Q

ART UNIT

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2611

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/584,716	Applicant(s) LIM ET AL.	
	Examiner LEON-VIET Q. NGUYEN	Art Unit 2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 August 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>8/25/06, 8/27/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on 8/27/07 was filed after the mailing date of 8/27/07. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Claim Rejections - 35 USC § 101

1. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim(s) 1-23 is/are rejected under 35 U.S.C. 101 as not falling within one of the four statutory categories of invention. Supreme Court precedent¹ and recent Federal Circuit decisions² indicate that a statutory “process” under 35 U.S.C. 101 must (1) **be tied to another statutory category (such as a particular apparatus), or (2) transform underlying subject matter (such as an article or material) to a different**

¹ *Diamond v. Diehr*, 450 U.S. 175, 184 (1981); *Parker v. Flook*, 437 U.S. 584, 588 n.9 (1978); *Gottschalk v. Benson*, 409 U.S. 63, 70 (1972); *Cochrane v. Deener*, 94 U.S. 780, 787-88 (1876).

² *In re Bilski*, 88 USPQ2d 1385 (Fed. Cir. 2008).

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state or thing. While the instant claim(s) recite a series of steps or acts to be performed, the claim(s) neither transform underlying subject matter nor positively tie to another statutory category that accomplishes the claimed method steps, and therefore do not qualify as a statutory process. For example, the methods of constructing frame preambles and acquiring frame synchronization in claims 1, 5, and 15 are not performed by any particular apparatus. It is unknown whether the methods as claimed are performed by software, which would render the claims non-statutory.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 10 and 17 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claims 10 and 17, it is unknown what exactly is being combined. The noncoherent combining is applied to the absolute value of the cross-correlation, but what values are combined?

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1 and 3 are rejected under 35 U.S.C. 102(b) as being anticipated by Kim et al (US20030072397).

Re claim 1, Kim discloses a method for constructing a frame preamble in an OFDM wireless communication system, comprising:

a) arranging a preamble (long preamble 36 in fig. 3) after a CP (guard interval 34 in fig. 3, ¶0036) located at the head of a frame (fig. 3); and

b) repeatedly arranging a pattern (¶0035, preamble 30 in fig. 3), which has a length shorter than a single OFDM symbol interval (fig. 3), an integer number of times (it would be necessary to repeat the pattern an integer number of times).

Re claim 3, Kim discloses a method wherein, when the length of an effective OFDM symbol interval other than the CP is T_b (fig. 3. Sections 32, 36, 38, and 40 have some length), the length of the pattern is T_b / N (the pattern 30 in fig. 3 is half the entire interval, therefore $N = 2$) and the preamble is constructed in a manner such that the pattern having the length of T_b / N is repeated K times (it would be necessary to repeat the pattern an integer number of times).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

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the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (US20030072397) in view of Goldstein et al (US20040081076).

Re claim 2, Kim teaches a method wherein the pattern shorter than a single OFDM symbol interval is phase-shifted in the time dimension (§§0090-§0091) and is repeatedly arranged an integer number of times (§0035).

Kim fails to teach adjacent cells that have different subcarrier offsets of pilot subcarriers arranged at a specific interval in the frequency dimension. However Goldstein teaches adjacent cells that have different subcarrier offsets of pilot subcarriers arranged at a specific interval in the frequency dimension (§0067). It would be obvious to repeat the preamble in the OFDM intervals.

Therefore taking the combined teachings of Kim and Goldstein as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Goldstein into the method of Kim. The motivation to combine Goldstein and Kim would be to mitigate the influence of frequency offset (§0067 of Goldstein).

5. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kim et al (US20030072397) in view of Dowling (US20060140298).

Re claim 4, Kim fails to teach a method wherein the length of the CP is 0. However Dowling a method wherein the length of a cyclic prefix is 0 (§0021).

Therefore taking the combined teachings of Kim and Dowling as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Dowling into the method of Kim. The motivation to combine Dowling and Kim would be to provide an exploitable structure to reduce complexity (§0021 of Dowling).

6. Claim 5 rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki (US6016329) in view of Skillermark et al (US20050111408).

Re claim 5, Iwasaki teaches a method for acquiring frame synchronization and searching cells based on cross-correlation using a preamble having a length that does not correspond to an integer number of times an OFDM symbol interval, comprising:

a) observing cross-correlation of a received signal and reference patterns (col. 1 lines 39-50) and detecting the moment when the absolute value of cross-correlation exceeds a pre-determined threshold (col. 1 lines 56-60) to acquire frame synchronization (col. 1 lines 18-20).

Iwasaki fails to teach observing cross-correlation of the received signal and reference patterns after the frame synchronization is acquired and detecting the moment when the absolute value of cross-correlation exceeds the pre-determined threshold to carry out cell search. However Skillermark teaches detecting the moment when the absolute value of cross-correlation exceeds the pre-determined threshold (§0030). It would be obvious to use take the absolutes value as taught by Iwasaki.

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Furthermore, the process of determining if a cross-correlation level exceeds a threshold taught by Skillermark occurs after synchronization (steps S1-S4 in fig. 1).

Therefore taking the combined teachings of Iwasaki and Skillermark as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Skillermark into the method of Iwasaki. The motivation to combine Iwasaki and Skillermark would be to increase the performance of a cellular system (§0011 of Skillermark).

7. Claims 6, 7, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki (US6016329) and Skillermark et al (US20050111408) in view of Husted et al (US20050100119).

Re claim 6, the modified invention of Iwasaki teaches a method comprising: measuring the power level of the received signal (block S5 in fig. 1 of Skillermark).

Iwasaki fails to teach normalizing a result of calculation of the cross-correlation using the measured power level and applying the normalized result to the threshold. However Husted teaches normalizing a result of calculation of the cross-correlation using the measured power level (§0049) and applying the normalized result to the threshold (§0049) .

Therefore taking the modified teachings of Iwasaki and Skillermark with Husted as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Husted into the method of Skillermark

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and Iwasaki. The motivation to combine Husted, Iwasaki and Skillermark would be to mitigate the effects of interference (§0013 of Husted).

Re claim 7, the modified invention of Iwasaki teaches a method wherein, when the normalized result is applied to the threshold (§0045 and §0049 of Husted), the normalized result is multiplied by a weight and applied (§0047 of Husted).

Re claim 15, all of the claim limitations have been analyzed and rejected with respect to claims 5 and 6.

Re claim 16, all of the claim limitations have been analyzed and rejected with respect to claim 7.

8. Claims 8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki (US6016329) and Skillermark et al (US20050111408) in view of Scott (US6363107).

Re claim 8, the modified invention of Iwasaki fails to teach a method wherein hard-limiting is applied to the received signal and the cross-correlation is executed.

However Scott teaches wherein hard-limiting is applied to the received signal (col. 37 lines 1-6, the received preamble is hard-limited) and the cross-correlation is executed (col. 37 lines 1-15, the received signal is input to the correlator).

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Therefore taking the modified teachings of Iwasaki and Skillermark with Scott as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Scott into the method of Skillermark and Iwasaki. The motivation to combine Scott, Iwasaki and Skillermark would be to reduce processing gain losses (col. 3 lines 56-58 of Scott).

Re claim 20, all of the claim limitations have been analyzed and rejected with respect to claim 8.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki (US6016329) and Skillermark et al (US20050111408) and Husted et al (US20050100119) in view of Scott (US6363107).

Re claim 9, the modified invention of Iwasaki fails to teach a method wherein hard-limiting is applied to the reference patterns and the cross-correlation is executed.

However Scott teaches wherein hard-limiting is applied to the reference patterns (col. 37 lines 1-6, the received preamble is hard-limited) and the cross-correlation is executed (col. 37 lines 1-15, the received signal is input to the correlator).

Therefore taking the modified teachings of Iwasaki and Skillermark with Scott as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Scott into the method of Skillermark and Iwasaki. The motivation to combine Scott, Iwasaki and Skillermark would be to reduce processing gain losses (col. 3 lines 56-58 of Scott).

10. Claims 11 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki (US6016329) and Skillermark et al (US20050111408) in view of Moher et al (US6693983).

Re claim 11, the modified invention of Iwasaki fails to teach a method further comprising calculating an average phase difference among the repeated patterns constructing the preamble appearing during a predetermined interval to estimate a carrier frequency based on the frame synchronization acquired at the a) after the b).

However Moher teaches calculating an average phase difference among the repeated patterns constructing the preamble appearing during a predetermined interval (col. 2 lines 61-63, the unique word is interpreted to be part of the preamble) to estimate a carrier frequency (col. 2 line 63 – col. 3 line 2).

Therefore taking the modified teachings of Iwasaki and Skillermark with Moher as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Moher into the method of Skillermark and Iwasaki. The motivation to combine Moher, Iwasaki and Skillermark would be to provide frame synchronization (col. 2 lines 40-41 of Moher).

Re claim 18, all of the claim limitations have been analyzed and rejected with respect to claim 11.

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11. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwasaki (US6016329) and Skillermark et al (US20050111408) and Husted et al (US20050100119) in view of Kim et al (US20030072397) and Goldstein et al (US20040081076).

Re claim 21, the modified invention of Iwasaki fails to teach a method wherein the preamble is constructed in a manner such that a specific pattern is repeated having a predetermined phase shift in the time dimension, and adjacent cells have different subcarrier offsets of preamble pilot subcarriers arranged at a specific interval in the frequency dimension.

Kim teaches a wherein the preamble is phase-shifted in the time dimension (¶0090-¶0091) and is repeatedly arranged an integer number of times (¶0035).

Therefore taking the modified teachings of Iwasaki, Skillermark, and Husted with Kim as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Kim into the method of Iwasaki, Skillermark, and Husted. The motivation to combine Kim, Iwasaki, Skillermark, and Husted would be to promote enhanced signal detection (¶0013 of Kim).

Goldstein teaches adjacent cells that have different subcarrier offsets of pilot subcarriers arranged at a specific interval in the frequency dimension (¶0067). It would be obvious to repeat the preamble in the OFDM intervals.

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Therefore taking the modified teachings of Iwasaki, Skillermark, and Husted with Goldstein as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the step of Goldstein into the method of Iwasaki, Skillermark, and Husted. The motivation to combine Goldstein, Iwasaki, Skillermark, and Husted would be to mitigate the influence of frequency offset (¶0067 of Goldstein).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to LEON-VIET Q. NGUYEN whose telephone number is (571)270-1185. The examiner can normally be reached on Monday-Friday, alternate Friday off, 7:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David C. Payne can be reached on 571-272-3024. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Leon-Viet Q Nguyen/
Examiner, Art Unit 2611

/Kevin M. Burd/
Primary Examiner, Art Unit 2611